PB-239 540

CLYDE POND, ORLEANS COUNTY, VERMONT

Pacific Northwest Environmental
Research Laboratory

Prepared for:

National Environmental Research Center
Vermont National Guard
Vermont State Agency of Environmental
Conservation

July 1974

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16. ABSTRACT
Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivded according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

CLYDE POND

ORLEANS COUNTY

VERMONT

EPA REGION I

WORKING PAPER No. 15

WITH THE COOPERATION OF THE

VERMONT AGENCY OF ENVIRONMENTAL CONSERVATION

AND THE

VERMONT NATIONAL GUARD

JULY, 1974

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FOREWORD

The National Eutrophication Survey was initiated in 1972 as a research project in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected fresh water lakes as a basis for formulating comprehensive and coordinated national, regional and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations and impacts can, in fact, be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

This report documents the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin. It is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/ standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Vermont Agency of Environmental Conservation for professional involvement and to the Vermont National Guard for conduct of the tributary sampling phase of the Survey.

Martin L. Jonnson, Secretary of the Vermont Agency of Environmental Conservation; Gordon R. Ryper, Commissioner of the Water Quality Division; David L. Clough, Director, James W. Morse II, Biologist, and Wally McLean, Sanitary Engineer of the Water Quality Division, provided invaluable lake documentation and counsel during the study. Reginald A. LaRosa, Director of the Water Supply and Pollution Control Division, and James F. Agan, Chief of the Operations Section of the Environmental Engineering Division, were most helpful in arranging for the sampling of wastewater treatment plants involved in the Survey.

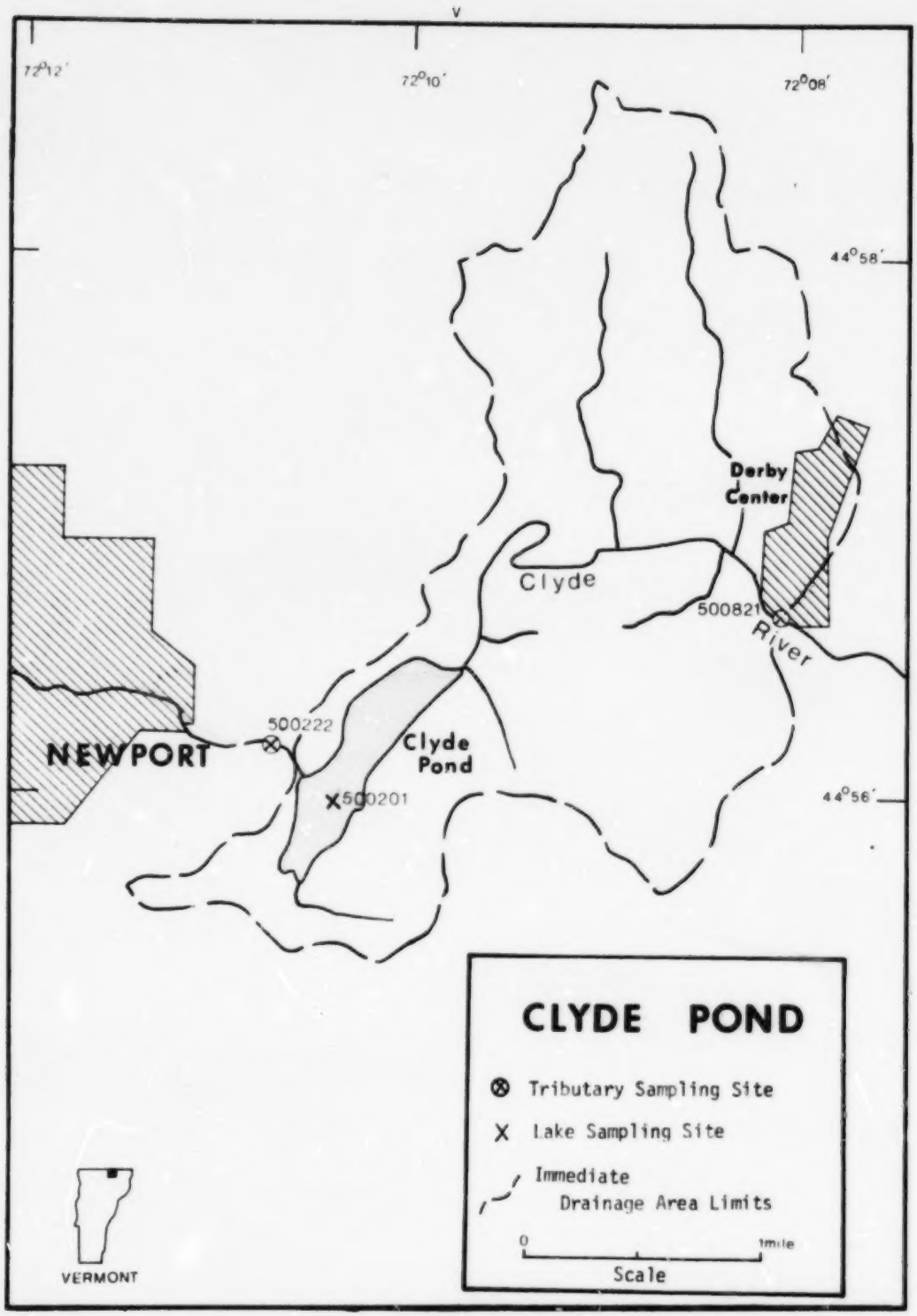
Major General Reginald M. Cram, the Adjutant General of Vermont, and Project Officer Major Howard Buxton, who directed the volunteer efforts of the Vermont National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF VERMONT

LAKE NAME	COUNTY
Arrowhead Mountain Lake	Chittenden, Franklin
Clyde Pond	Orleans
Harriman Reservoir	Windham
Lake Champlain	Addison, Chittenden, Franklin
Lake Lamoille	Lamoille
Lake Memphremagog	Orleans
Waterbury Reservoir	Washington, Lamoille


72°12'
72°10'
72°08'
44°58'
44°56'
Derby Center
Clyde
500821
River
500222
NEWPORT
Clyde Pond
500201
CLYDE POND
Tributary Sampling Site
Lake Sampling Site
Immediate Drainage Area Limits
0
1mile
Scale
VERMONT

CLYDE POND

STORET NO. 5002

I. CONCLUSIONS

A. Trophic Condition:

When studied, Clyde Pond was eutrophic, although the relatively low algal assay control yield and phosphorus and nitrogen concentrations were more indicative of a mesotrophic condition. However, the very short hydraulic residence was suppressing the effects of very high nutrient loading rates.

B. Rate-Limiting Nutrient:

The results of the algal assay show that Clyde Pond was phosphorus limited; these results are supported by the pond data.

C. Nutrient Controllability:

1. Point sources--During the sampling year, Clyde Pond received a total phosphorus load at a rate over two times greater than a eutrophic rate (see page 16). Of this load, it is estimated that the villages of Derby Center and Island Pond contributed about 19%. Even complete removal of phosphorus at these sources would only reduce the loading rate to 6.8 $g/m^2/yr$ (still about twice a eutrophic rate). Therefore, it is concluded that point-source phosphorus control would not result in a significant improvement in the trophic condition of Clyde Pond. However, these sources also impact

Lake Memphremagog and are considered further in the report on that lake.

2. Non-point sources--The mean annual phosphorus export of the Clyde River was about the same as the exports of unimpacted Vermont streams in other drainages (see page 17). However, the drainage area/lake area ratio of 365/1 will insure an excessive non-point phosphorus load to Clyde Pond from the Clyde River alone.

II. INTRODUCTION

Clyde Pond (see map, page v) is a small shallow body of water of natural origin; however, the natural water level has been altered by an outflow control dam which was put in operation in early 1957 for power production.

The Pond supports only limited recreation, and public access is practically nil. Fishing is reported to be only fair, and other water-based recreation is discouraged by the Citizens Utilities Company which operates the power plant.

III. LAKE AND DRAINAGE BASIN CHARACTERISTICS

A. Lake Morphometry:

1. Surface area: 140 acres.
2. Mean depth: 11 feet.
3. Maximum depth: 20 feet.
4. Volume: 1,540 acre/feet.
5. Mean hydraulic retention time: 3.6 days.

B. Tributary and Outlet:
(See Appendix A for flow data)

1. Tributaries -

Name	Drainage area*	Mean flow*
Clyde River	134.8 mi^2	205.6 cfs
Minor tributaries & immediate drainage -	5.0 mi^2	7.6 cfs
Totals	139.8 mi^2	213.2 cfs

2. Outlet -

Clyde River	140.0 mi^2**	213.2 cfs

C. Precipitation†:

1. Year of sampling: 47.4 inches.
2. Mean annual: 36.9 inches.

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* Drainage areas are accurate within ±1%; gaged flows are accurate within ±15%, and ungaged flows are accurate within ±20%.
** Includes area of lake.
† See Working Paper No. 1, "Survey Methods".

IV. LAKE WATER QUALITY SUMMARY

Clyde Pond was sampled three times during the open-water season of 1972 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two or more depths at a single station on the lake (see map, page v). During each visit, a single depth-integrated (near bottom to surface) sample was collected for phytoplankton identification and enumeration; and during the last visit, a single five-gallon depth-integrated sample was collected for algal assays. Also each time, a depth-integrated sample was collected for chlorophyll *a* analysis. The maximum depth sampled was 15 feet.

The results obtained are presented in full in Appendix B; and the data for the fall sampling period, when the lake was essentially well-mixed, are summarized below. Note, however, the Secchi disc summary is based on all values.

For differences in the various parameters at the other sampling times, refer to Appendix B.

A. Physical and chemical characteristics:

Parameter	Minimum	Mean	Median	Maximum
		FALL VALUES (10/05/72)		
Temperature (Cent.)	13.1	13.2	13.2	13.3
Dissolved oxygen (mg/l)	8.0	8.5	8.5	9.0
Conductivity (μmhos)	160	160	160	160
pH (units)	6.6	6.7	6.8	6.8
Alkalinity (mg/l)	54	55	55	57
Total P (mg/l)	0.019	0.020	0.021	0.021
Dissolved P (mg/l)	0.006	0.006	0.006	0.006
NO_2 + NO_3 (mg/l)	0.100	0.107	0.100	0.120
Ammonia (mg/l)	0.040	0.047	0.040	0.060
		ALL VALUES		
Secchi disc (inches)	60	68	66	77

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Number per ml
06/03/72	1. Dinobryon	259
	2. Merismopedia	241
	3. Melosira	211
	4. Synedra	145
	5. Cyclotella	139
	Other genera	512
	Total	1,507
07/03/72	1. Chroococcus	1,213
	2. Dinobryon	558
	3. Schroederia	226
	4. Micractinium	181
	5. Gleocapsa	136
	Other genera	421
	Total	2,735
10/05/72	1. Dinobryon	1,190
	2. Cyclotella	376
	3. Fragilaria	346
	4. Flagellates	331
	5. Cryptomonas	286
	Other genera	2,215
	Total	4,744

2. Chlorophyll *a* -
(Because of instrumentation problems during the 1972 sampling, the following values may be in error by plus or minus 20 percent.)

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
06/03/72	01	(not done)
07/03/72	01	10.2
10/05/72	01	4.8

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.007	0.163	0.2
0.006 P	0.013	0.163	1.8
0.012 P	0.019	0.163	3.3
0.024 P	0.031	0.163	3.9
0.060 P	0.067	0.163	4.3
0.060 P + 10.0 N	0.067	10.163	28.1
10.0 N	0.007	10.163	0.2

2. Discussion -

The control yield of the algal assay shows that the productivity of Clyde Pond was quite low at the time the sample was collected. Also, the increased yields with increased levels of ortho-P (to about 19 µg/l) show that Clyde Pond was phosphorus limited. Note that the addition of only nitrogen produced a yield no greater than the control yield.

The lake data indicate phosphorus limitation at the other sampling times as well. The N/P ratio in June was 38/1 and in July was 16/1, and phosphorus limitation would be expected.

D. Trophic Condition:

Data obtained during the Survey indicate that Clyde Pond is eutrophic. However, the apparent trophic condition of the Pond is greatly influenced by the very short hydraulic retention time of 3.6 days.

With such "flow-through" conditions, the accumulation of nutrients is minimal; and the concentrations of nutrients are directly dependent on, and vary directly with, the concentrations in the Clyde River inlet. This accounts for the fact that, even though the Pond was receiving a total phosphorus loading in excess of 74 lbs/acre/yr (8.3 $g/m^2/yr$), the mean total phosphorus concentration in the Pond was relatively low.

The relatively low mean nutrient concentrations and the low algal assay yield are more indicative of a mesotrophic condition. However, the consistent, though not extreme, depression of dissolved oxygen with depth, only fair Secchi disc transparency, and a relatively high mean chlorophyll a concentration indicate a eutrophic condition.

Whatever the trophic condition of Clyde Pond appears to be, the fact remains that only the flow-through hydraulic regime of the Pond is preventing extreme eutrophication.

V. NUTRIENT LOADINGS
(See Appendix C for data)

For the determination of nutrient loadings, the Vermont National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of April and May when two samples were collected. Sampling was begun in July, 1972, and was completed in July, 1973.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the New England District Office of the U. S. Geological Survey for the Clyde River outlet (station 500222); these flows, adjusted for immediate drainage and minor tributary flows, were used to determine loadings at station 500821 at Derby Center.

The latter tributary station was originally selected as a Lake Memphremagog tributary site and is also shown on the site map for that lake. The upstream Clyde River station originally selected for Clyde Pond (500221) is located about 12 stream miles above Derby Center; but because of the distance from Clyde Pond, the site could not logically be used as an inlet station. Further, the intervening Pensioner Pond, Lubber Lake, and Salem Pond may be nutrient traps; however, it is likely the hydraulic retention time of these water bodies is very short, like that of Clyde Pond, and minimal accumulation of nutrients occurs.

In this report, nutrient loads for sampled tributaries were calculated using mean concentrations and mean flows; and nutrient loadings for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated by using the nutrient loads, in lbs/mi^2/year, in nearby Johns River at station 0851 and multiplying by the ZZ area in mi^2.

The untreated sewage discharges of the villages of Derby Center and Island Pond were not sampled during the Survey, and nutrient loads were estimated*. In this report, all of the nutrient loads from Derby Center are assumed to have reached Clyde Pond during the sampling year; however, since the Village of Island Pond is some 20 stream miles above Clyde Pond and discharges to Island Pond, the headwaters of the Clyde River, it is assumed that 60% of the total phosphorus load and 10% of the total nitrogen load from that source were sedimented and/or biologically assimilated in the intervening waters during the sampling year. In the following tables, the nutrient loads attributed to the Clyde River are those measured at station 21 (upstream from the Derby Center discharge) minus the estimated Island Pond loads.

* See Working Paper No. 1, "Survey Methods".

A. Waste Sources:

1. Known municipal -

Name	Pop.* Served	Treatment	Mean* Flow (mgd)	Receiving Water
Derby Center	430	None	0.043	Clyde River
Island Pond	300	None	0.030	Island Pond - Clyde River

2. Known industrial - None

* Estimated; see Working Paper No. 1, "Survey Methods".

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	lbs P/ yr	% of total
a. Tributaries (non-point load) -		
Clyde River	8,080	77.8
b. Minor tributaries & immediate drainage (non-point load) -	330	3.2
c. Known municipal -		
Derby Center	1,510	14.5
Island Pond	420	4.0
d. Septic tanks* -	30	0.3
e. Known industrial - None	-	-
f. Direct precipitation** -	20	0.2
Total	10,390	100.0

2. Outputs -

Lake outlet - Clyde River 8,810

3. Net annual P accumulation - 1,530 pounds

* Estimated 50 dwellings in immediate drainage; see Working Paper No. 1.
** Estimated; see Working Paper No. 1, "Survey Methods".

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	lbs N/ yr	% of total
a. Tributaries (non-point load) -		
Clyde River	329,350	93.1
b. Minor tributaries & immediate drainage (non-point load) -	15,480	4.4
c. Known municipal -		
Derby Center	4,040	1.1
Island Pond	2,540	0.7
d. Septic tanks* -	1,180	0.3
e. Known industrial - None	-	-
f. Direct precipitation** -	1,350	0.4
Total	353,940	100.0

2. Outputs -

Lake outlet - Clyde River	384,880

3. Net annual N loss - 30,940 pounds

* Estimated 50 dwellings in immediate drainage; see Working Paper No. 1.
** Estimated; see Working Paper No. 1, "Survey Methods".

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	lbs P/mi^2/yr	lbs N/mi^2/yr	N/P Ratio
Clyde River	60	2,443	41/1

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (1973). Essentially, his "dangerous" rate is the rate at which the receiving waters would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

	Total Phosphorus		Total Nitrogen	
Units	Total	Accumulated	Total	Accumulated
lbs/acre/yr	74.2	10.9	2,528.1	loss*
grams/m^2/yr	8.32	1.22	283.4	-

Vollenweider loading rates for phosphorus (g/m^2/yr) based on mean depth and mean hydraulic retention time of Clyde Pond:

"Dangerous" (eutrophic rate)	3.40
"Permissible" (oligotrophic rate)	1.70

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, unknown and unsampled point sources discharging directly to the lake, or underestimation of the nitrogen loads from the villages of Derby Center and Island Pond. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's National Eutrophication Research and Lake Restoration Branch.

F. Controllability of Nutrients:

1. Point sources--During the sampling year, Clyde Pond received a total phosphorus load at a rate nearly 2½ times greater than a eutrophic rate. Of this load, it is calculated that the villages of Derby Center and Island Pond contributed about 19%. Even complete removal of phosphorus at these sources would only reduce the loading rate to about 60 lbs/acre/yr or 6.8 $g/m^2/yr$ (a rate still about twice the eutrophic rate). It is concluded, therefore, that point-source control of phosphorus would not result in a significant improvement in the trophic condition of Clyde Pond. However, the Clyde River is also tributary to Lake Memphremagog; and, because of the minimal phosphorus retention in Clyde Pond (about 15%), the controllability of these point-source phosphorus loads is discussed further in the Lake Memphremagog report (Working Paper No. 19).

At the time of preparation of this report, plans for secondary treatment at the Village of Island Pond (Brighton Town) have been approved, and a preliminary engineering report on secondary treatment at the Village of Derby Center has been approved (Morse, 1974).

2. Non-point sources--The mean annual phosphorus export of the Clyde River drainage (see page 16) was about the same as the exports of unimpacted Vermont streams studied outside of the Clyde River drainage system (mean = 52 $lbs/mi^2/yr$; range = 30-65 $lbs/mi^2/yr$),

and the N/P ratio of 41/1 indicates that unknown point sources, if any, are minimal. However, the drainage area/lake area ratio of 365/1 will insure an excessive phosphorus load to the pond from the Clyde River alone of about 58 lbs/acre/yr (6.5 $g/m^2/yr$) until inputs from non-point sources can be reduced.

VI. LITERATURE REVIEWED

Clough, David, 1973. Personal communication (Derby Center discharge point; literature coefficients; uses of Clyde Pond). Dept. Water Resources, Montpelier.

Gormsen, Paul, 1973. Personal communication (estimated contributing population of Derby Center; industries in drainage; literature coefficients).

Morse, James W., 1974. Personal communication (status of Vermont water pollution control facilities, Jan., 1974). Dept. Water Resources, Montpelier.

Morse, James W., II, and P. Howard Flanders, 1971. Primary productivity study of three Vermont lakes. Water Qual. Surv. Ser. Rept. No. 2, Agency of Env. Cons., Montpelier.

Vollenweider, Richard A., 1973. Input-output models. MS, Canada Centre for Inland Waters, Burlington, Ontario.

TRIBUTARY FLOW INFORMATION FOR VERMONT 7/9/74

LAKE CODE 5002 CLYDE POND

TOTAL DRAINAGE AREA OF LAKE 140.00

TRIBUTARY	SUB-DRAINAGE AREA	NORMALIZED FLOWS JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
500222	29.00	24.60	23.70	48.40	172.00	62.40	32.80	18.70	19.40	19.70	30.20	41.80	37.10	44.16
500221	111.00	94.10	90.60	185.00	659.00	239.00	125.00	71.70	74.10	75.50	115.80	160.00	142.00	168.96
500222	140.00	119.00	114.00	234.00	832.00	301.00	158.00	90.40	93.50	95.20	145.00	202.00	179.00	213.22

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 140.00
SUM OF SUB-DRAINAGE AREAS = 140.00
TOTAL FLOW IN = 2561.80
TOTAL FLOW OUT = 2563.10

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
500222	7	72	39.60						
	8	72	27.00						
	9	72	11.40						
	10	72	20.90						
	11	72	45.10						
	12	72	42.30						
	1	73	49.20						
	2	73	41.50						
	3	73	102.00						
	4	73	127.00						
	5	73	98.60						
	6	73	73.50						
	7	73	95.00						
500221	7	72	152.00	15	91.00				
	8	72	103.00	12	98.20				
	9	72	43.80	19	38.20				
	10	72	79.60	15	59.20				
	11	72	173.00	9	451.00				
	12	72	162.00	7	472.00				
	1	73	188.00	24	664.00				
	2	73	159.00	21	110.00				
	3	73	388.00	21	626.00				
	4	73	487.00	23	454.00				
	5	73	378.00	6	393.00	23	809.00		
	6	73	240.00						
	7	73	364.00	7	472.00				

TRIBUTARY FLOW INFORMATION FOR VERMONT 7/9/74

LAKE CODE 5003 CLYDE POND

MEAN MONTHLY FLOWS AND DAILY FLOWS

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
500223	7	72	192.00	15	115.00				
	8	72	130.00	12	124.00				
	9	72	55.20	19	48.20				
	10	72	100.00	15	74.60				
	11	72	218.00	9	568.00				
	12	72	204.00	7	595.00				
	1	73	238.00	24	837.00				
	2	73	200.00	21	139.00				
	3	73	491.00	21	790.00				
	4	73	615.00	17	665.00	23	573.00		
	5	73	476.00	6	496.00	23	1021.00		
	6	73	354.00						
	7	73	459.00	7	595.00				

APPENDIX B

PHYSICAL and CHEMICAL DATA

K - Value is less than indicated
J - Value known to be in error

STORET RETRIEVAL DATE 74/07/02

500201
44 56 00.0 072 10 05.0
CLYDE POND
50 VERMONT

11EPALES
3

2111202
0012 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3-N TOTAL MG/L	00665 PHOS-TOT MG/L P	00666 PHOS-DIS MG/L P
72/06/03	17 05	0000	18.5	8.7	66	100	7.50	36	0.170	0.050	0.016	0.006
	17 05	0015	17.8	8.3		100	7.40	36	0.180	0.050	0.012	0.006
72/07/31	16 15	0000			77	145	8.40	54	0.060	0.050	0.021	0.009
	16 15	0004	23.3	10.0		145	8.40	54	0.100	0.070	0.022	0.009
	16 15	0009	22.4	9.0		135	7.60	54	0.070	0.140	0.024	0.011
72/10/05	10 30	0000			60	160	6.80	55	0.100	0.040	0.019	0.006
	10 30	0004	13.3	9.0		160	6.80	54	0.100	0.040	0.021	0.006
	10 30	0009	13.1	8.0		160	6.65	57	0.120	0.060	0.021	0.006

DATE FROM TO	TIME OF DAY	DEPTH FEET	32217 CHLRPHYL A UG/L
72/07/31	16 15	0000	10.2J
72/10/05	10 30	0000	4.8J

APPENDIX C

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

K - Value is less than indicated
J - Value known to be in error

STORET RETRIEVAL DATE 74/07/02

500222
44 56 00.0 072 10 30.0
CLYDE RIVER
50 15/MEMPHREMAGOG
0/CLYDE POND
NEWPORT CITIZENS UTILITY PLANT
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/07/15	11	12	0.096	1.025	0.056	0.010	0.030
72/08/12	11	30	0.078	1.300	0.036	0.008	0.027
72/09/19	10	15	0.104	1.050	0.068	0.008	0.025
72/10/15	12	18	0.290	0.450	0.140	0.005K	0.030
72/11/09	12	20	0.200	0.380	0.056	0.008	0.024
72/12/07	09	50	0.240	0.320	0.024	0.009	0.014
73/02/21	09	00	0.390	0.940	0.470	0.006	0.015
73/03/21	10	45	0.370	0.380	0.031	0.005K	0.020
73/04/17	10	15	0.280	0.440	0.168	0.005K	0.015
73/04/23	14	10	0.240	0.480	0.027	0.005K	0.015
73/05/06	09	15	0.190	0.300	0.016	0.005K	0.020
73/05/23	11	05	0.189	0.420	0.023	0.006	0.025
73/07/07	11	00	0.105	2.100	0.990	0.005K	0.025

STORET RETRIEVAL DATE 74/07/02

500821
44 50 30.0 072 10 30.0
CLYDE RIVER
50019 15/CLYDE POND
I/LAKE MEMPHREMAGOG
DERBY CENTER BRDG
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/07/15	11 36		0.148	0.650	0.028	0.009	0.018
72/08/12	11 10		0.112	0.830	0.044	0.009	0.016
72/09/19	10 30		0.180	0.250	0.044	0.008	0.011
72/10/15	12 32		0.190	0.400	0.080	0.019	0.039
72/11/09	12 30		0.195	0.630	0.094	0.066	0.100
72/12/07	10 05		0.252	0.300	0.029	0.012	0.014
73/01/24	14 10		0.350	0.390	0.052	0.005K	0.015
73/02/21	10 05		0.370	1.000	0.440	0.005K	0.010
73/03/21	14 45		0.360	0.200	0.020	0.005K	0.015
73/04/17	10 35		0.270	0.260	0.030	0.005K	0.010
73/04/23	14 35		0.250	1.050	0.046	0.005K	0.010
73/05/06	10 50		0.170	0.280	0.011	0.005K	0.010
73/05/23	08 55		0.168	0.370	0.039	0.005K	0.010
73/07/07	09 00		0.089	1.760	1.300	0.005K	0.020

STORET RETRIEVAL DATE 74/07/02

500221 LS500221
44 50 30.0 072 01 30.0
CLYDE RIVER
50 15/MEMPHREMAGOG
I/CLYDE POND
BRDG CHARLESTON CENTER SCHOOL
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
72/07/15	12 07		0.152	0.850	0.038	0.005K	0.021
72/08/12	11 00		0.098	0.460	0.028	0.008	0.017
72/09/19	10 50		0.139	0.450	0.046	0.008	0.011
72/10/15	12 50		0.195	0.400	0.072	0.005K	0.010
72/11/09	12 50		0.234	1.800	0.100	0.078	0.115
72/12/07	10 20		0.320	0.350	0.023	0.011	0.014
73/01/24	14 30		0.370	0.690	0.250	0.005K	0.015
73/02/21	10 20		0.260	0.200	0.054	0.005K	0.010
73/03/21	14 30		0.260	0.400	0.105	0.005K	0.010
73/04/17	10 50		0.210	0.230	0.017	0.005K	0.010
73/04/23	14 50		0.180	0.600	0.017	0.005K	0.010
73/05/06	09 30		0.160	0.290	0.029	0.005K	0.015
73/05/23	09 10		0.110	0.380	0.015	0.005K	0.015
73/07/07	09 10		0.056	0.480	0.147	0.005K	0.015